

THE LAST SWIDERIANS IN LITHUANIA

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Abstract

This paper focuses on an issue that was, and still remains, unsolved in Baltic Stone Age archaeology: the dating of the very end of the period of Swiderian culture. This time, the questions raised are what cultural unit (or units) should be considered as the last Swiderians, and who were the last tanged point users in general? In addition, the latest AMS 14C dates from the Mesolithic Pabartoniai 1 site in central Lithuania are taken into consideration within the archaeological context recorded during excavations in 2014–2016. Several archaeological objects – flint artefacts, knapped sandstone pebbles, burnt material and a few archaeological features – that were eliminated from the Late Mesolithic horizon and hypothetically interpreted as pre-existent, are discussed as maybe belonging to the Late Swiderian archaeological horizon. This data suggests some alternative insights into what was previously declared about the chronology of the last Swiderians: it brings up the very slight possibility that this culture could have lasted as long as up to the early Boreal period, or around 400 years later than the formerly agreed dating. However, this study should be seen as the very first step in the discussion, which still needs argumentation and other case studies to be carried out until the hypothesis is proven.

Key words: Swiderian culture, Mesolithic, Preboreal, Boreal, AMS radiocarbon dating, Lithuania.

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Introduction

The chronology of Late Swiderian culture in Lithuania has been actualised in recent years, after most of the Final Palaeolithic-Early Mesolithic archaeological material found in the western part of the basin of the River Neris was revised and repeatedly evaluated. After excavating 100 square metres of the prehistoric site at Pabartoniai, particularly difficult multi-layered material was unearthed. The site, which was inhabited at least several times in the Mesolithic as well as later periods, yielded a complex of mixed finds, and an almost indecipherable sequence of different archaeological horizons and layers, which is very common to the sandy sites. Yet, after making a big effort to discern the earliest find horizon and investigate the dating results, a preliminary view of the first stages of the site settlement was developed. The difficulty, however, was the very first stage that was considered to be related to Swiderian culture on the basis of flint artefacts found at the site. It did not exactly conjoin with the Late Mesolithic data; therefore, the option to put together the earlier dates and the earliest finds into one context was explored.

This data and the leading hypothesis were presented at the UISPP world congress (Paris, June 2018), where a discussion on the issue generated different opinions. On one hand, the lack of argumentation did not allow it to be fully accepted; but on the other hand, it was apparently also discussed as probably not the very first case when an extended dating of the Swiderian era

was considered when interpreting analogous data from elsewhere in the Baltic region. Therefore, in this article, more detailed information on the issue is provided for a closer study of the arguments for and against the ideas presented.

Research history

The history of research on the genesis, flint artefact typology, spread of occurrence and the economy of Swiderian culture has been given in many scientific works so far, giving the most credit to Polish archaeologists. Thus, in this article, we focus particularly on the efforts put into the investigation of the end of the period of Swiderian culture in Lithuania. The very first opinions to be expressed concerning this issue probably go back to the early 20th century, when this archaeological unit was discerned. Its disappearance was then related to the appearance of Tardenoisian and other Mesolithic cultures within the clear climatic change from the Yoldia Sea period to the Ancylus Lake phase (Krukowski 1921; 1922). The ending of Swiderian culture in Poland was understood from a geological perspective, paying most attention to stratigraphy (Antoniewicz 1930; Sawicki 1923; 1930). By then, Swiderian culture was already distinguished as a unit in Lithuanian archaeology. On the basis of the point similarities, the area occupied by the Swiderians was extended up to Estonian territory (Puzinas 1938). Cases where Swiderian tools were unearthed in the same places as Mesolithic artefacts occurred frequently. This

confusing situation was solved by ascribing the lower and older layers to the Swiderian cultural horizon.

On the basis of flint tool typology, several different industrial units were discussed as equal to or different from Swiderian (for example, the so-called Chwalibogovice industry), and it took some time before a three-stage-based Swiderian culture concept was suggested (Sawicki 1936). The very end of its existence was considered as hypothetically reaching the Younger Dryas period, with a probable step into the Preboreal. The last stage of Swiderian culture was ascribed to the so-called Epi-Palaeolithic.

An alternative concept was also introduced, the Masovian cycle, which overwhelmed several Final Palaeolithic industrial stages, including the Swiderian stage. At first, it was preliminarily dated to the Bölling-Younger Dryas, yet later the chronology was clarified and extended up to the Preboreal (Schild 1960; 1964; Chmielewski 1962; Chmielewski et al. 1975). The end of the cycle was related to the ecological zone shift northwards, and the disappearance of some Arctic animal species, *Rangifer tarandus* in particular. The term Masovian cycle was later used to name the period when Swiderian and Ahrensburgian cultures existed (Galiński, Sulgostowska 2010).

By the time the Masovian cycle was established, the first 14C datings of Swiderian culture were introduced in Polish archaeology. Dated samples from the Całowanie and Witów sites allowed archaeologists to finally present a chronology of Swiderian culture in several stages. Its existence in the Younger Dryas and Early Preboreal was proven. As was noted then, one date from the Całowanie site that could have been related to Swiderian finds was somehow 700 years later. It was regarded as accidental, and having nothing in common with the Masovian cycle (Chmielewski et al. 1975), and this opinion has not changed (Schild et al. 1999). Thus, after obtaining the first exact dating results, Swiderian culture was still seen as lasting no longer than until the Early Preboreal. By that time, research into this cultural unit had reached its peak, and archaeologists from all the Baltic region, Belarus, Ukraine and Russia were proposing different chronology concepts and divisions of stages (Gurina 1966; Sulgostowska 1989; Zalizniak 1989). However, all of them still did not exceed the border of Early Preboreal. A few decades ago, the evolution of Swiderian culture in Poland was seen as a little different to its evolution in Lithuania and in areas further to the east: the eighth millennium BC was seen as the period when Swiderians vanished from Poland, but still remained and evolved in Lithuania (the use of tanged points, even if

modified, was interpreted as a continuation of the tradition) (Kozłowski 1999; Libera 1999).

The Lithuanian archaeologist Rimutė Rimantienė (1984) was critical of its very late dating even up to the Ancylus Lake period, as was previously presumed by some Polish scholars. Instead, she suggested distinguishing a separate period, the so-called Epi-Palaeolithic, which marked the ending of Swiderian and other Palaeolithic archaeological cultures on Lithuanian territory, but at the same time encompassed the typical Swiderian tool technology that was believed to have been continuously inherited from its predecessors. It has to be borne in mind that back then, the concept of two stages of Swiderian culture dominated, characterised by tanged points with a tightened tang elaborating from those with a non-tightened tang (later, it was changed to the opposite). In addition, the relation between site topography and chronology was also regarded as fundamental, however, later it was proven to be misleading. Therefore, the Swiderian tool ascription to the Epi-Palaeolithic context was also puzzling. The main question – when did the Swiderian era end – remained unsolved, even after establishing a new cultural unit. Meanwhile, the opinion that it must have ended at the very end of the Preboreal, before other Mesolithic cultures appeared, seemed to be acceptable to both Polish and Lithuanian archaeologists. As long as no 14C dates were obtained from Lithuania, this theory was regarded as convincing. Yet R. Rimantienė has also expressed the idea that Epi-Palaeolithic culture still existed even when the classic Mesolithic appeared (Rimantene 1971). Accordingly, this meant that some tool makers who used a Swiderian flat-retouch technique for manufacturing points were believed to have still existed as well.

The approach was put forward that at the end of the Epi-Palaeolithic period, some inhabitants might have migrated eastwards or southwards, while the rest could have assimilated with the cultures of the newcomers (Rimantene 1971). One of the cultural units that was considered to be Mesolithic, but to have retained Swiderian types of tools, was Microlithic-Macrolithic culture (later renamed Mesolithic Neman culture), which partially originated from Maglemosian (Rimantene 1971; Rimantienė 1984). These tools were very different to classic Swiderian ones; they were made out of very regular blades produced from unipolar cores, and had a flat retouch on the ventral side of the tang and retouched sides of the tip. The manner of producing them was supposed to have existed in the Boreal (Rimantienė 1984).

In addition to Epi-Palaeolithic and Mesolithic Neman archaeological cultures, by that time, also Kunda cul-

ture name was introduced into Lithuanian Stone Age archaeology. It was related to the inventory found at the Pulli site in Estonia, and was already a well-known unit to Baltic area archaeologists. Kunda was regarded as having points of epi-Swiderian type, because of the specific way of point production (Rimantienė 1984). After establishing the concept of a genetic relationship between Swiderian and Kunda cultures, it was believed for some time that there could still have been a chronological gap between them around the Preboreal-Early Boreal period (Kozłowski 1969). The main difference between Swiderian and epi-Swiderian Kunda points was the cores used to produce them: in Kunda culture, unipolar conical cores were primarily used for pressure technique, while classic Swiderian culture, besides the unipolar technique, was known to have used cores with two platforms as well. As a result, the blanks, very regular and irregular blades, differed.

Thus, in the second half of the 20th century, the main Swiderian technological feature, flat retouch on the ventral side of the point tang, was identified in Final Palaeolithic Swiderian culture, and also in several Mesolithic cultures. The concept of the continuity of this tool-making technique was accepted, and was incorporated into theories related to Mesolithic cultures. By then, it was already evident that the flint core knapping techniques had changed over time, but the manner of a particular secondary working of a point tang remained the same. However, for most archaeologists, this feature was considered not to be important enough to simply call the continuity of its use as Swiderian. Therefore, the terms epi-Swiderian, post-Swiderian, similar to Swiderian, etc, took their place in the depictions of tool assemblages (Kozłowski, Kozłowski 1977; Kolcov 1977). Despite the incomprehension these terms evoked (Sulgostowska 1999), they were later developed, and have remained in use up until today.

Scientific discussions about why the flat retouch technique was applied even after the way of core preparation had changed were rather silent. Also, the aesthetic aspect of point formation was barely considered: it was apparent only when Pulli and Swiderian points were compared (Sulgostowska 1999), but not when the transitional type of points was discussed. One question that provoked discussion was the purpose of applying a flat retouch to both ends of the point, the tang and the tip. This manner was interpreted as a way to straighten a curved blank profile (Sulgostowska 1999), and hinted at a general change in the purpose of the technique (in Swiderian culture, the tang was retouched to flatten the bulb, and in the Pulli culture, the same technique was applied to make both ends of the blank thinner, despite the bulb's placement).

Despite the use of multiple terms to depict a special secondary retouch technique, another difficult issue was the chronology of all the cultures that were regarded as its users. After 50 years of investigations of Swiderian culture in the context of other archaeological units that are known to have existed in the area concerned, it was concluded that the Pulli tool making technology appeared earlier than Swiderian culture had vanished (Kozłowski 1975; Ianits 1990). In addition, a gap between the beginning and the end of the seventh millennium was regarded as an unclear period: either Swiderian culture must have lasted longer, or Mesolithic Neman culture must have appeared earlier, if the concept of one culture changing the other is accepted. It was very difficult to clarify exactly what happened in that period of time. According to R. Rimantienė, the main characteristics of that period were assimilation, mixing and interchanging, whether the people or the material culture was held in mind. Significantly, changes were seen as more important than retained, inherited things, like the Swiderian type of retouch. A feature that had played nearly the most important role in distinguishing Final Palaeolithic cultures became less significant when analysing Mesolithic cultures.

After many excavations and the analysis of flint assemblages from various sites in Lithuania in recent decades, Lithuanian archaeologists declared that the idea of distinguishing an Epi-Palaeolithic period was misleading. A lot of material was revised, and an alternative theory was proposed: Late Swiderian culture was discerned as a continuation of Swiderian culture in the Early Mesolithic (Ostrauskas 1998; 1999; Štavičius 2001; 2005; 2009; 2016). The period under concern started to be regarded not as mixed as it was before; instead, a clearer sequence of cultural evolution was perceived. A more or less established opinion on the disappearance of Late Swiderian culture became accepted: the theory claimed that most probably in the first half of the Preboreal period, this culture could have moved northwards behind herds of seasonally migrating animals (Zaliznyak 1999). According to archaeologists, in a while, some people might have remained in their old habitat, and transformed into the unit that was regarded as Kunda culture. It was seen as a culture that was directly derived from Swiderian in Lithuanian territory, and then extended their habitat to the north and the east (Štavičius 2016). Points with a flat retouch on the tang and tip from the ventral side made from regular blades produced from unipolar conical cores, were ascribed to Kunda or post-Swiderian type (the latter title hinted at a direct technological continuity from Swiderian culture).

The Kunda problem

In the Baltic region, the title Kunda was and still is used for all inventories that yielded tools similar to the ones found at the Pulli site in Estonia (Butrimas, Ostrauskas 1999; Sulgostowska 1999; Girininkas 2009). The most important artefact is the typical Pulli-type point (Fig. 1). However, similar tanged points with not tightened tangs made on blades produced from unipolar cores were sometimes ascribed to this culture, even when classic Pulli points were missing in the inventory (Fig. 2). Some Lithuanian archaeologists have interpreted the latter finds as transitional type, from Swiderian to Kunda. This interpretation supported the evolutionary concept of Kunda culture evolving from Swiderian. However, the Pulli-type point had a clearly depicted particularly typical shape, and the manner it was produced was different. Therefore, the approach that Pulli might have been the first stage of Kunda culture was proposed. However, the majority of points ascribed to the so-called transitional phase from Swiderian to Kunda were short, but still had their tips retouched. Thus, the straightening of the curved blank profile might not have been a reason to apply this retouch when short points were produced: regular blades of only a few centimetres' length were not usually very curved. This fact might imply tool production from fragmented blades, or that the aesthetic aspect of the production of points played a significant role.

Some archaeologists have discussed an alternative concept, that the origin of Pulli points reaches northeast territories and they have a connection with cultures that existed there (Sorokin 1995; Zhilin 1996; Sulgostowska 1999). The view that Pulli was something different from Swiderian, that it did not evolve from it, was presented and argued. Its northern or eastern origin is now regarded as the most reliable, after the latest research done on the development of the regular blade production technique in the northeast Baltic region; the northeast origin of this manner of flint knapping was proven convincingly (Sørensen et al. 2013). Significantly, this could mean that Pulli was also different to the so-called transitional inventory that has recently been ascribed to Kunda culture in Lithuania.

After detaching Pulli assemblages from the so-called transitional inventories, the latter could be described as the last stage of Swiderian culture in which the unipolar core knapping technique for regular blade production (and microlithic technology) was learnt. Taking into account techniques of secondary retouch that were used in this stage, two or three techniques should be discussed separately:

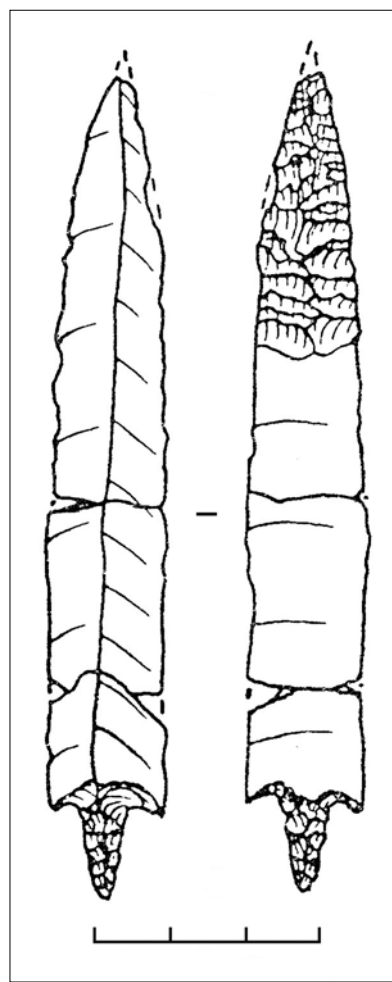


Fig. 1. A point typical of Pulli type, found at Ringuvėnai in northern Lithuania (according to Ostrauskas 1998, Fig. 12.3).

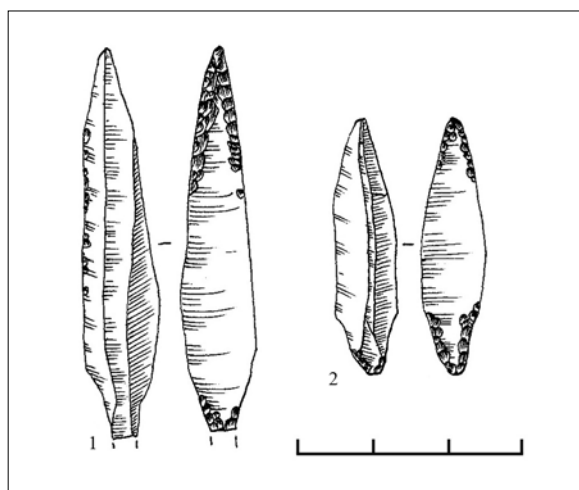


Fig. 2. Points that are usually ascribed to the so-called post-Swiderian Kunda culture, or a transitional type from Swiderian to Kunda, found at the Kernavė site in eastern Lithuania (drawing by G. Gudaitienė).

1. the flat retouch on the tang,
2. the flat retouch on the other parts of the point body's ventral side, and
3. the marginal retouch applied on the sides.

The first feature is undoubtedly inherited from Swiderian culture, and shows a continuation of the tradition, while the other two might be the influence of Pulli culture. When it comes to deciding what title should be applied to these points (and their contextual assemblage), it becomes a matter of determining which technique was adapted first: the flat retouching of the ventral side of a point, or the unipolar core preparation. In other words, could it be that these were Swiderians who simply got to know about unipolar flintknapping? Only when this question is answered can the concept of cultural continuity or assimilation be proposed. Whereas, it has to be mentioned that the appearance of microlithic technology might also be related to the probable influence of Maglemose culture.

The Late Swiderian points made from more regular blades, and with a tip retouched from the ventral side, were previously regarded as post-Swiderian, but the term *post* should mean something that appeared after something was gone, and the main characteristic of Swiderians, retouching the ventral side of the blank, was not gone, it was still in use. Therefore, the Late Swiderian phase might be regarded as lasting until these points were not produced any more. The flat retouching of the point tip, and the use of unipolar cores, could be seen as two techniques that were admired and copied by Late Swiderians soon after they got into contact with people who produced Pulli points. It was something they might have wanted to learn, and some of the points that were previously named as post-Swiderian transitional could be seen as unprofessional 'copies' of Pulli points. It is very difficult to determine if these groups of people who produced similar points to Pulli had actually ever made Pulli points.

It might be presumed that for some time, and maybe for quite a long period of time, these two cultures, Late Swiderians and Pulli culture, might have coexisted. In addition, the so-called transitional inventory could imply a third group of people coexisting in the same territory: Late Swiderians, who were starting to use the new introduced flint knapping techniques. All these three communities might have shared the same site-catchment territory and flint mining area in southern Lithuania, while flint material, as well as wonderful Pulli points, could have been objects of their exchange.

The toolkit of the last Swiderians

In this paper, not only is the question raised what cultural unit should be called the very last Swiderians, but also the multicultural view of Early and Middle Mesolithic is considered. It is probable that in the Preboreal, one part of Swiderian culture continued to survive without the impact of other cultures, while another part might have been influenced by some 'new trends'. Thus, the coexistence of two different groups of Swiderians in the Preboreal and up to the Boreal period might be taken into account. In other words, even if the previously proposed concept of so-called Kunda or post-Swiderian culture is accepted, this still does not mean that there were no 'old-fashioned' Swiderians existing at the same time. The adoption of new trends in technologies did not always result as a general pattern overwhelming all the population at once.

There are only a few 14C dates from one Swiderian site in Kabeliai, Lithuania (Ostrauskas 1998). They show the probable existence of this culture in the Preboreal period, and correlate with data from sites investigated in Poland. However, this data does not let us consider the Kabeliai 2 site as the very last settlement of the Swiderian epoch people. Thus, on this basis, it would be incorrect to state that the era ended exactly in the Preboreal. Similarly, without having the exact AMS 14C dates, it is not possible to tell if the so-called post-Swiderian Kunda sites were the very last ones in Lithuania yielding tanged points in general. Therefore, two possible toolkits of the last Swiderians are presented here (classic Pulli-type inventory is excluded) (Figs. 3 and 4).

The first toolkit is known as a typical Late Swiderian assemblage (Fig. 3). It usually consists of:

1. Leaf-shaped points made of semi-regular or regular blades, with a not tightened tang, a bulb part flattened by a retouch from the ventral side, and sometimes some retouch applied to the tip;
2. The remains of cores with double platforms as well as unipolar cores;
3. End scrapers made out of semi-regular or regular blades;
4. End scrapers combined with burins;
5. Burins formed on a break or on a truncation, made out of semi-regular or regular blades;
6. Some microliths.

The second toolkit is known in the literature as Kunda, transitional to Kunda, or post-Swiderian. It contains:

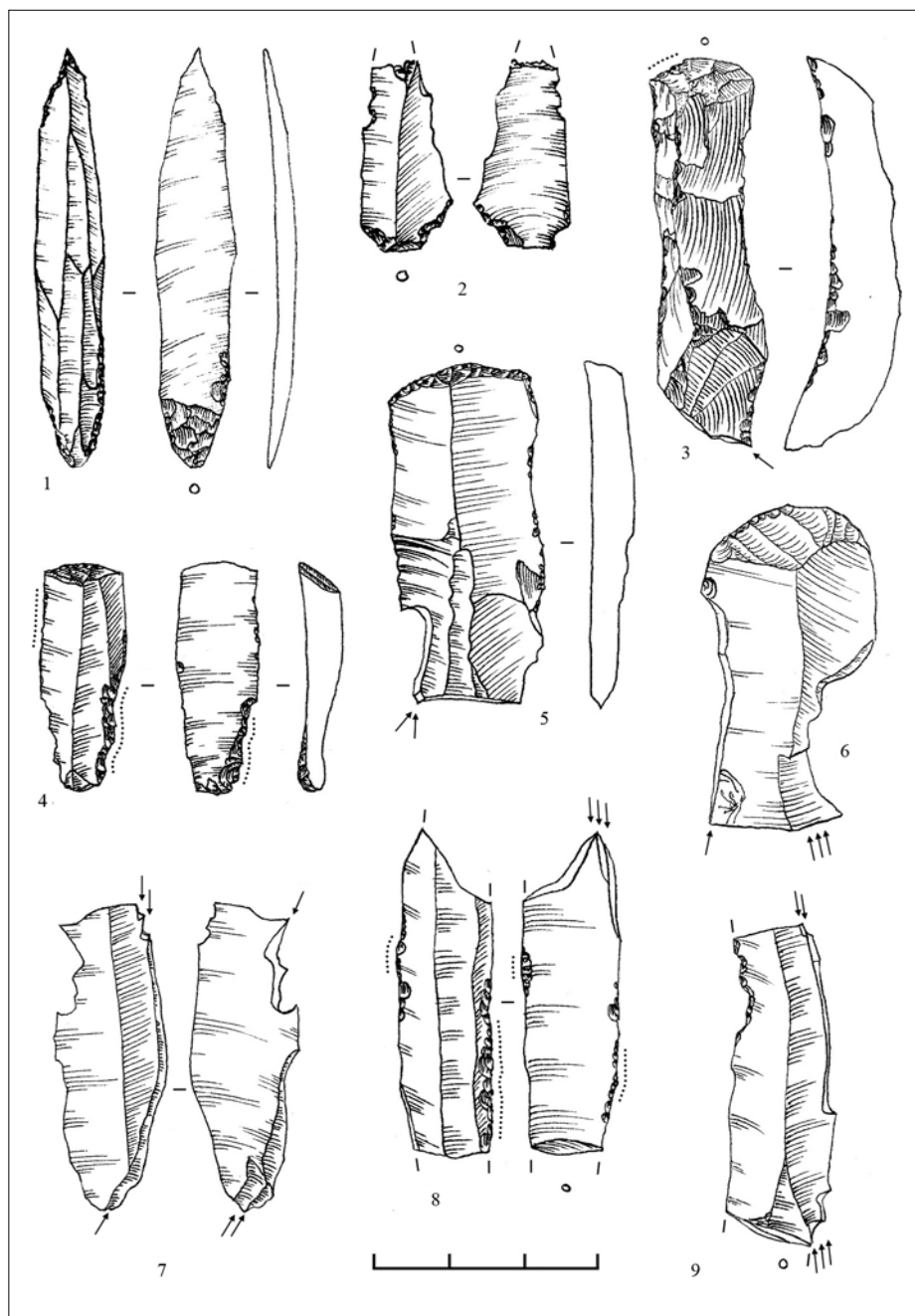


Fig. 3. The Late Swiderian assemblage unearthed at the Pabartoniai 1 site in central Lithuania (drawing by G. Gudaitienė).

1. Tanged points with a tightened tang made out of regular blades, usually very symmetrical by Y-axis, with some flat retouch applied on a tang part and the tip;
2. Unipolar cores;
3. End and side-scrapers with some marginal retouch applied on the edges;
4. Burins on a truncation or on a break, made from regular blades;
5. Microliths.

The rest of the toolkit might be the same in both toolkits, as well as in inventories of other cultures. As these toolkits are usually unearthed in sites later inhabited by other Mesolithic and Neolithic people, it is very difficult to correctly ascribe the category of microliths to a certain unit.

Concerning the northern part of Lithuania, it has to be noted that lithic assemblages containing points made in the Late Swiderian manner were more numerous than those that yielded the Kunda-type artefacts, and their latest dating is still not determined. Archaeological data from the Pabartoniai 1 site depicted below gives

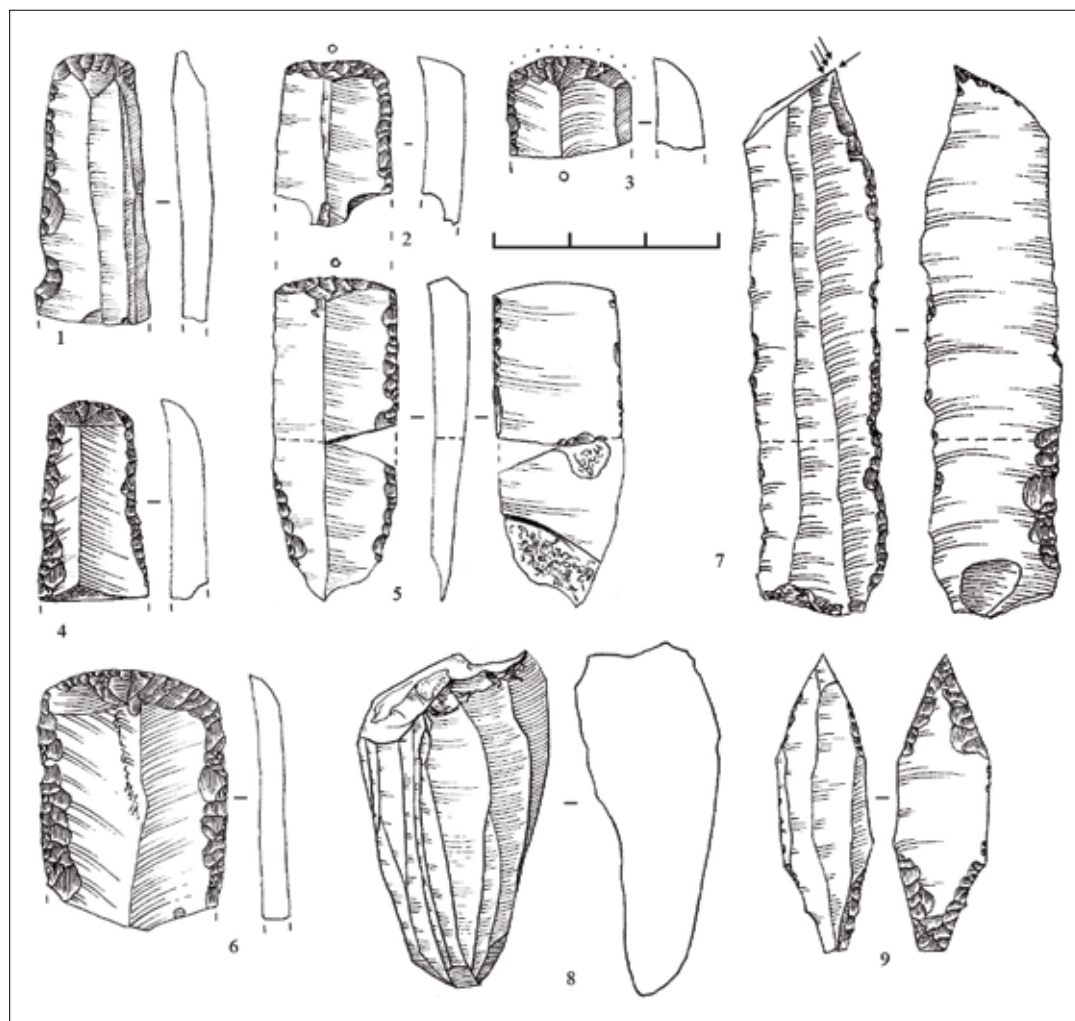


Fig. 4. An assemblage usually ascribed to the so-called post-Swiderian Kunda culture, or transitional from Swiderian to Kunda complexes, found at the Kernavė (1, 3-4, 6-7) and Saleninkai 1 (2, 5, 8-9) sites in central-eastern Lithuania (drawing by G. Gudaitienė).

a the very slight possibility that some groups of Late Swiderian people remained conservative about the manner of point production, even long after coexisting with people who had switched to the unipolar regular blade production technique.

A case study: Swiderians at the Pabartoniai 1 site

The site is situated in the village of Pabartoniai, on the second terrace above the floodplain on the right bank of the River Neris, around 290 to 310 metres to the north from the River Neris flow, approximately ten metres above the water level, near a small tributary (Fig. 5). The first small collection of retouched flint artefacts was collected from the sandy surface more than 70 years ago by the academician K. Jablonskis and his daughter R. Jablonskytė (Jablonskis 1947). At that time, all the lithic assemblage was interpreted

as Neolithic, but the small list of artefacts, identified as epi-Swiderian points, microliths, a scraper, a flint striker and a fragment of a polished stone axe, already implied that there was a mixture of different period finds, meaning it was settled over a long period of time (Rimantienė 1974). The site was ascribed to Swiderian culture in the last decades of the 20th century, and was later included in the scientific literature that overviewed Lithuanian Final Palaeolithic archaeology (Girininkas 2009).

The site was relocated in 2014, and a detailed investigation of a 100-square-metre area was carried out (Gudaitienė 2015; 2016a; 2016b; 2017). The data provided in this article comprises material taken from the National Museum of Lithuania and the latest excavations. Typological analysis of all the flint tools unearthed has shown that there were several separate assemblages that could be ascribed to the Neolithic, Mesolithic, and presumably Early Mesolithic, stages



Fig. 5. The location of the Pabartoniai 1 site on the right bank of the River Neris (LiDAR data based map; drawing by G. Gudaitienė).

of site occupation. The latter was determined on the basis of some artefacts typical to the Late Swiderian culture.

Analysis of the deepest stratigraphic layers of the site and the find horizon has shown that the terrace of the River Neris formed at the very end of the Pleistocene as a gravel/sand bank of the river. By then, the third terrace, around 20 metres high, already existed 120 to 330 metres away from the bank, to the northwest. During flooding of the river, the terrace was constantly supplemented with silt and very fine-grain sand. Aeolian processes also had an influence on the formation of the postglacial approximately 20 to 30-centimetre-thick light yellow-white fine-grain silty sand layer, which is visible in the trench profile. The place was suitable for settlement by the very end of the Younger Dryas, or in the early Preboreal (some Final Palaeolithic and Early Mesolithic sites along the river were found on a lower terrace, so it might be assumed that it formed earlier than the Preboreal). The site could have been a few hundred metres away from the bank of the 130-metre-wide river, more or less as it is today. Therefore, it may be presumed that the water level of the River Neris at the time Pabartoniai was first settled could also have been similar.

The archaeological remains of the first settlers were covered by sand due to aeolian processes. While the first terrace sand drifted, various bioturbations moved the artefacts in the ground. As different groups of peo-

ple came to settle in this place in the Mesolithic and Neolithic, the archaeological material of various stages of settlement mixed and shifted, vertically as well as horizontally. Aeolian processes continued, and the yellow fine-grain sand and light brown sand layers formed another 30-centimetre-thick stratigraphic layer.

More than 30 different features relating to Stone Age-Bronze Age horizons have been uncovered in the area unearthed during excavations. Over three years of excavating, it has become clear that the most intensely inhabited area, the 'central part' of the settlement, has already been located, while a large part of the peripheral area to the north has also been investigated.

Most of the archaeological objects were unearthed at a depth of 70 to 120 centimetres, in light brown-yellow fine-grain sand. The difference between the top elevation points of the features was quite slight. Nevertheless, the following insights were considered when the archaeological data was analysed and compared, and some features were excluded from the analysis as not corresponding to the chronological stage of concern:

- The higher the feature top was, the more intense/darker its colour was;
- Taphonomically, the darker-coloured stains found higher were related to a later period than those that appeared lower, had a lighter colour and a more blurred outline. The presumption was later confirmed by AMS 14C dating applied to feature No 9

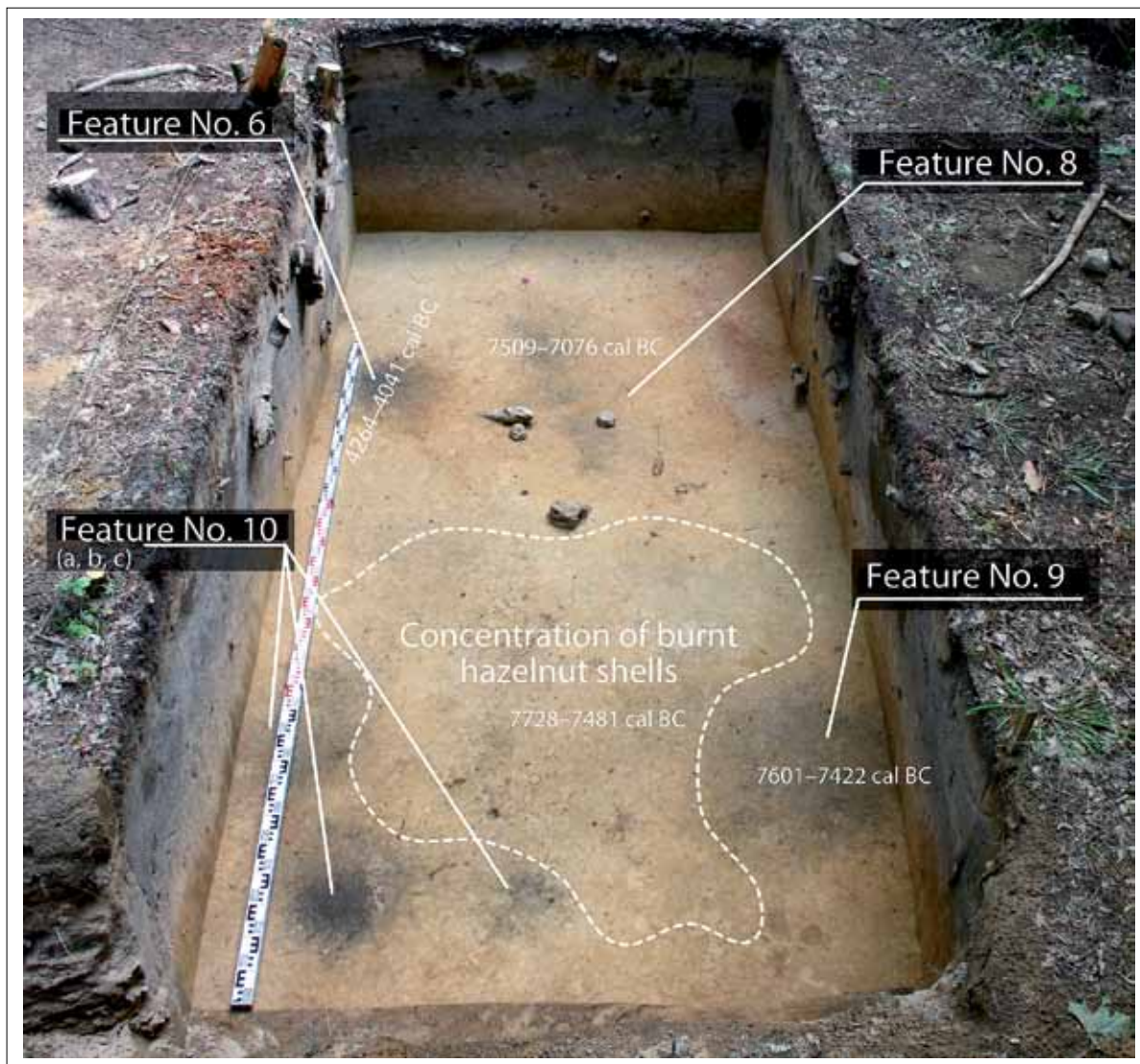


Fig. 6. One of the trenches (I-J/25-28) at the Pabartoniai 1 site: stratigraphically the lowest layer, with overlapping Neolithic and Mesolithic horizons of archaeological features (photograph by G. Gudaitienė).

(light grey colour, Middle Mesolithic) and feature No 6 (very dark grey/black, Neolithic) (Fig. 6).

- The stains of a more intense colour vanished relatively higher (some of them even higher than the top of other objects have appeared). This feature has shown that at least a few separate stages of settling were evident.

Even though the upper stratigraphic layer of features could reasonably have been disregarded as not related to the earliest settlement, there were still more than a dozen objects unearthed deeper. These objects could either be connected and be of the same chronology, or some separate archaeological horizons could have been distinguished. The features found in the lowest layers were all of the same colour intensity, and reached or intervened into the deepest bottom ground, white fine-grain sand with limonite inclusions. They

were ascribed to the earliest stages of the settlement of the site.

The archaeological objects (bioturbation stains excluded) differed in size and form, and their outline was usually hard to define. In the process of excavating, the form of most of them changed slightly, from oval or circular to formless, or vice versa. Some consisted of several segments, due to post-depositional processes, mostly bioturbations. Some features seemed to have been recessed into the ground.

Only a few features containing stone pebbles/boulders were unearthed, but in most cases they were related to the darker or more intense colour stains unearthed a little higher; therefore, they were taphonomically dated to the Neolithic and later phases of site occupation. Some individual stone pebbles and little boulders were also uncovered.

The AMS 14C dating method was applied to samples taken from nine archaeological objects that were unearthed in the deepest layers in the Pabartoniai 1 site: features Nos 2, 6, 8, 9, 10d, 20, 24, 25 and 30. Most samples were charcoal fragments; one burnt hazelnut shell sample was also investigated. The research was done at the Mass Spectrometry Laboratory, at the Centre for Physical Sciences and Technology in Vilnius (FTMC) (except sample COL-3261, which was investigated at the Centre for Accelerator Mass Spectrometry at the University of Cologne). Samples were prepared by applying the acid-base-acid three step treatment (Molnar et al. 2013): 1M hydrochloric acid, 1M sodium hydroxide, and 1M hydrochloric acid. Then they were dried before combustion, and were graphitised using an Automated Graphitisation Equipment AGE-3 (IonPlus AG). The 14C/12C ratio measurements of the graphitised samples were made using a Single Stage Accelerator Mass Spectrometer (SSAMS, NEC, USA). The accuracy of the measured 14C/12C ratio was greater than 0.3%. The processed background was estimated using Phthalic acid, and it was determined to be 2.45×10^{-3} fM. IAEA-C3 and IAEA-C9 standards were taken as reference materials. For the isotopic fractionation correction, a ratio of 13C to 12C was applied. The results revealed that the site was settled several times in the Mesolithic and the Neolithic. At least three stages of occupation were distinguished (Fig. 7). The remains of several settlement horizons were overlaid (Fig. 8); therefore, the data was very difficult to interpret.

At first, the earliest horizon of archaeological features was presumed to date to the Middle Mesolithic. Features Nos 8 and 9 were related to one stage of site occupation in approximately 7 500–7 600 cal BC (Gudaitienė 2016); whereas feature No 10d, a grey sediment stain, was of arguable dating. It was unearthed in the lowest stratigraphic layer, and dated by AMS 14C dating to 8644 ± 101 BP FTMC-1-5 (7986-7516 cal BC [93%]). It might either have been related to this stage, or it could have been even earlier. Significantly, it contained a sandstone core with fitting flakes (Fig. 9), that were relatively ascribed to the same period.

Feature No 10d contained an end-scraper made out of a crested blade that was probably produced from a double-platform core. Therefore, it was not related to the unipolar core use and regular blade production technology recorded in the area around Middle Mesolithic features Nos 8 and 9. The sandstone core and flakes found in feature No 10d were not the only artefacts of such a type recorded at the Pabartoniai 1 site. An analogous assemblage of knapped sandstone was found five metres away, in the context of feature No 25 (Fig. 10). Both features were unearthed in the deepest

stratigraphical layer. On this basis, it is assumed that they can be of the same chronology, and belong to the first stage of the site's occupation.

Some charcoal samples were also investigated four metres away from feature 10d, they were taken from the context of feature No 30. One sample taken from the periphery of the feature stain did not match with samples collected from its centre: it was much earlier, dated to 8740 ± 45 BP FTMC-9-5-1 (7942-7610 cal BC [95.4%]) and 8874 ± 45 BP FTMC-9-5-2 (8228-7831 cal BC [95.4%]). These results were preliminarily linked to the dating of feature No 10d.

Four dating results of two charcoal samples from feature No 25 were obtained. One of them was dated to 8702 ± 71 BP FTMC-1-1-1 (7967-7584 cal BC [95%]) and correlated with the datings from feature Nos 10d and 30. Thus, a very slight chance was seen that the dating results of features Nos 10d, 25 and a charcoal piece found close to feature No 30 could be ascribed to the same chronological stage. Hypothetically, a stage of anthropogenic activity dating to approximately 7900–7800 cal BC was regarded as probably the earliest settlement recorded at the Pabartoniai 1 site.

It has to be noted that in the close vicinity of features Nos 10d and 25, two flint burins, a few retouched blades, a residue of a double-platform core and some blanks produced from a double-platform core were discovered. In general, on the basis of lithic typology and the flint-working technique applied, some artefacts were ascribed to a certain archaeological culture related to the use of double-platform cores and the production of non-regular and semi-regular blades. Products of double-platform core working were ascribed to the earliest stage of site occupation, the Late Swiderian stage, because the typical Late Swiderian point unearthed at the site was made out of a blank produced from a double-platform core. It is presumed that the toolkit of the earliest inhabitants must have consisted of implements produced using this flint knapping technique. Thus, some scrapers, burins and scrapers combined with burins were also related to this settlement stage.

The flint debitage that remained from double-platform cores was not numerous, while tools were made from all sorts of blanks, and also from the core correction and decortication flakes. However, the refitting method could not be applied yet: further excavations have to be undertaken until an appropriate amount of debitage is collected to refit the cores. Thus, on the basis of the archaeological data excavated until today, it might be presumed that only several nodules of good-quality flint were brought to the site during the very first visit. It has to be borne in mind that the unipolar flintknapping

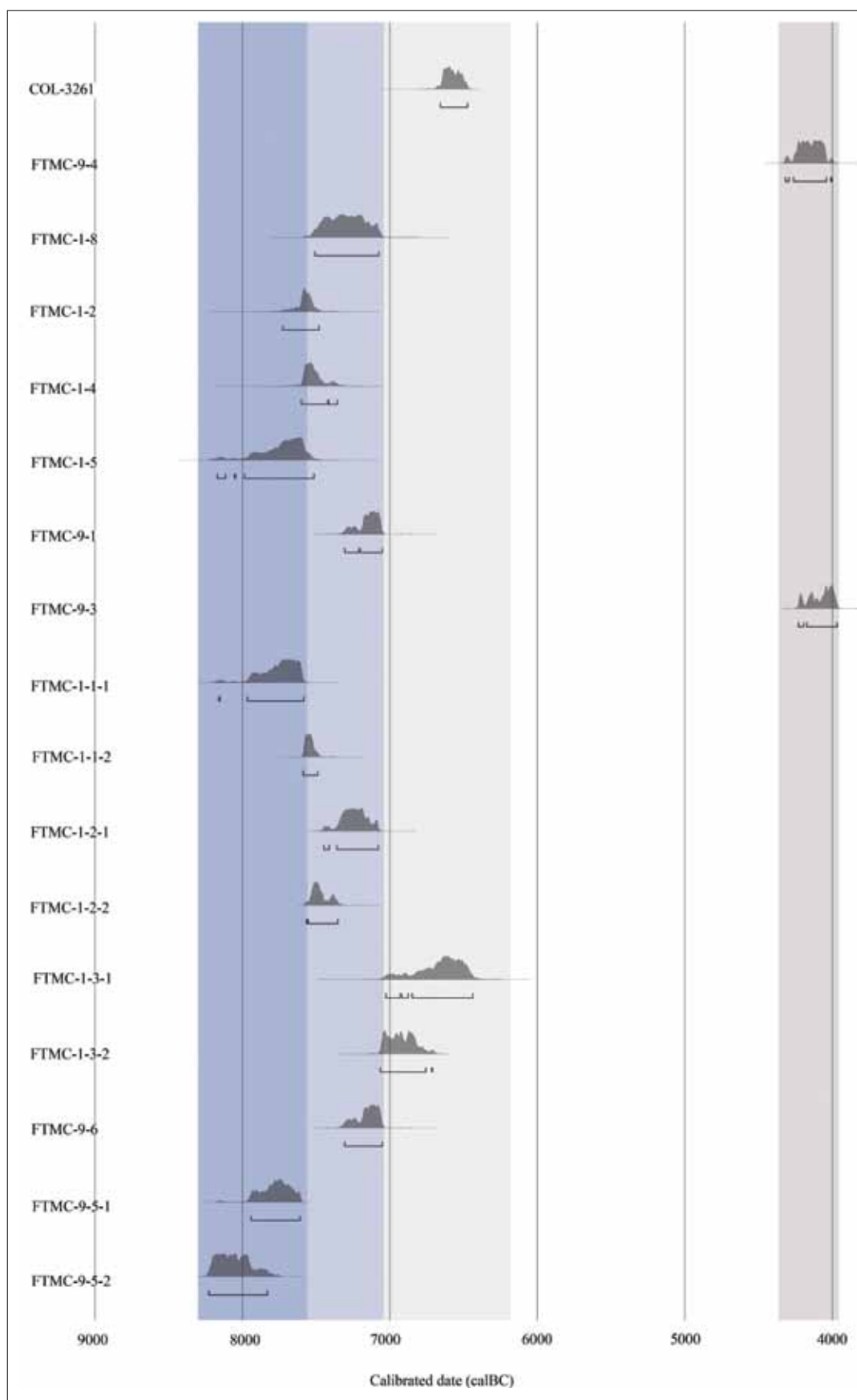


Fig. 7. A diagram of all AMS 14C dates obtained from the Pabartoniai 1 site. Calibrated by OxCal v4.3.2 (Bronk Ramsey 2017) and IntCal13 atmospheric curve (Reimer et al. 2013).

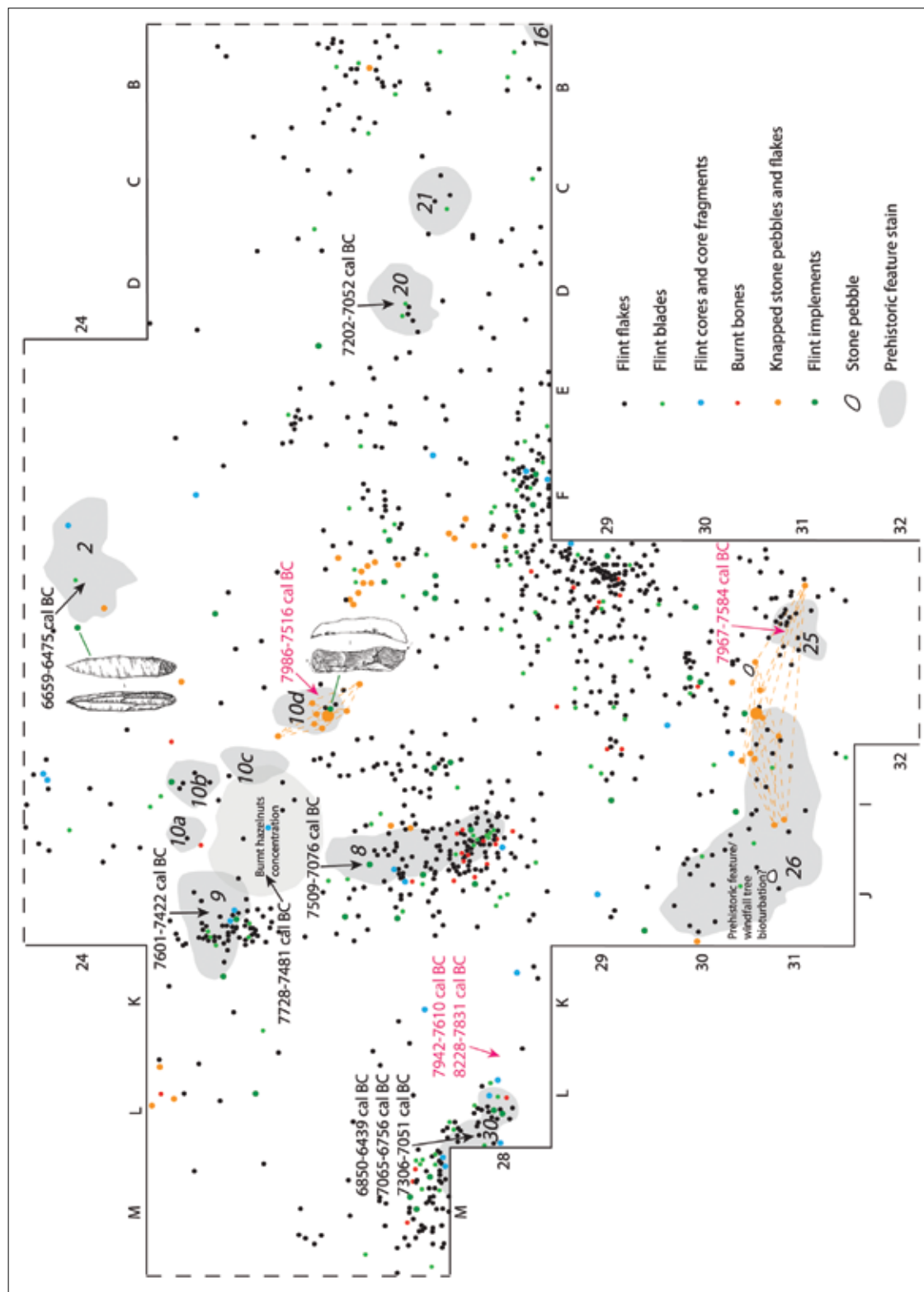


Fig. 8. Part of the Pabartoniai 1 site excavation plan, showing the lowest layer with some Mesolithic features and artefacts unearthed in relatively the deepest horizon (all Neolithic features, bioturbations and artefacts found in upper layers excluded) (drawing by G. Gudaitienė and M. Džiautas).

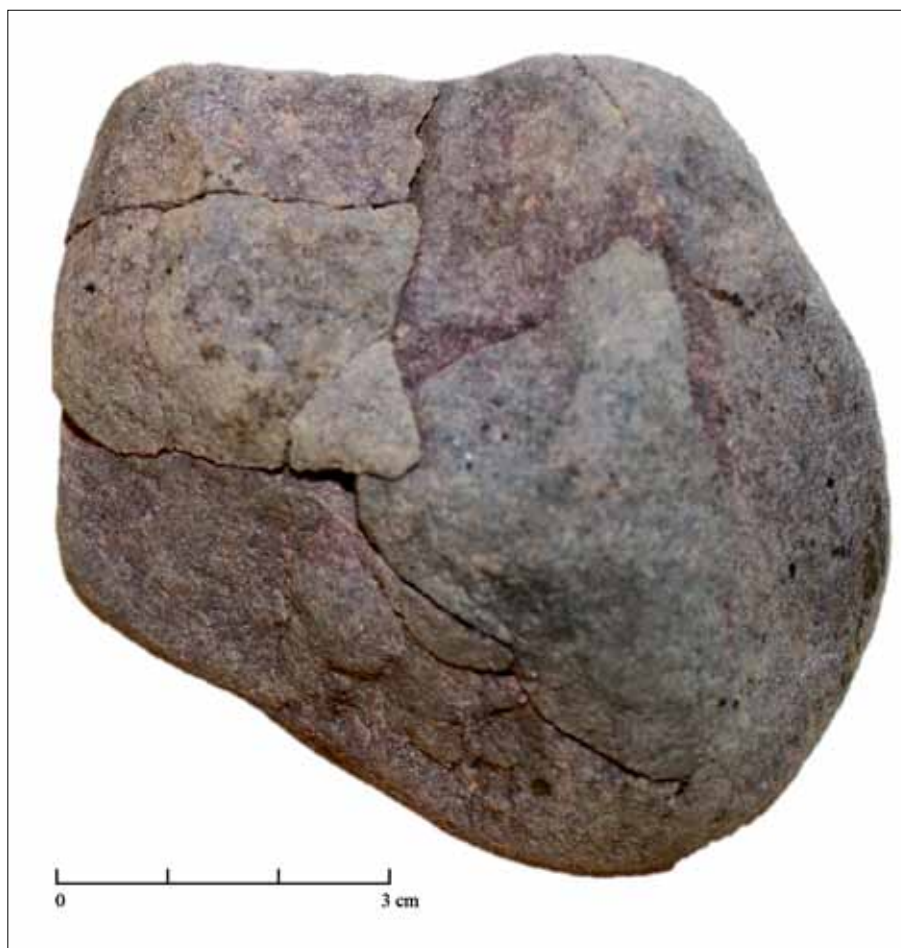


Fig. 9. A knapped sandstone pebble and fitting flakes found in the context of feature No 10d, at the Pabartoniai 1 site (photograph by G. Gudaitienė).

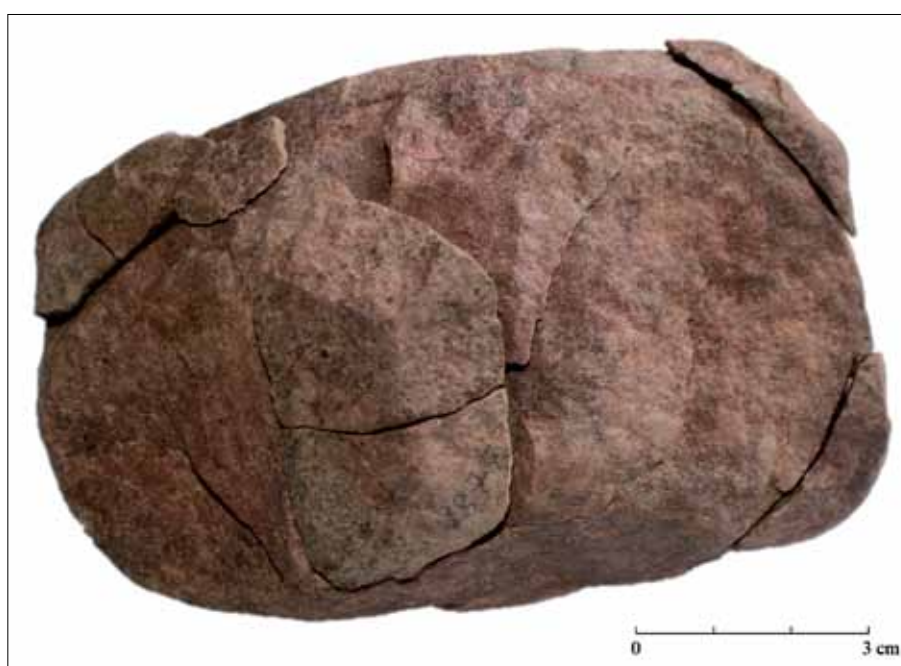


Fig. 10. A knapped sandstone pebble and fitting flakes found in the context of feature No 25 at the Pabartoniai 1 site (photograph by G. Gudaitienė).

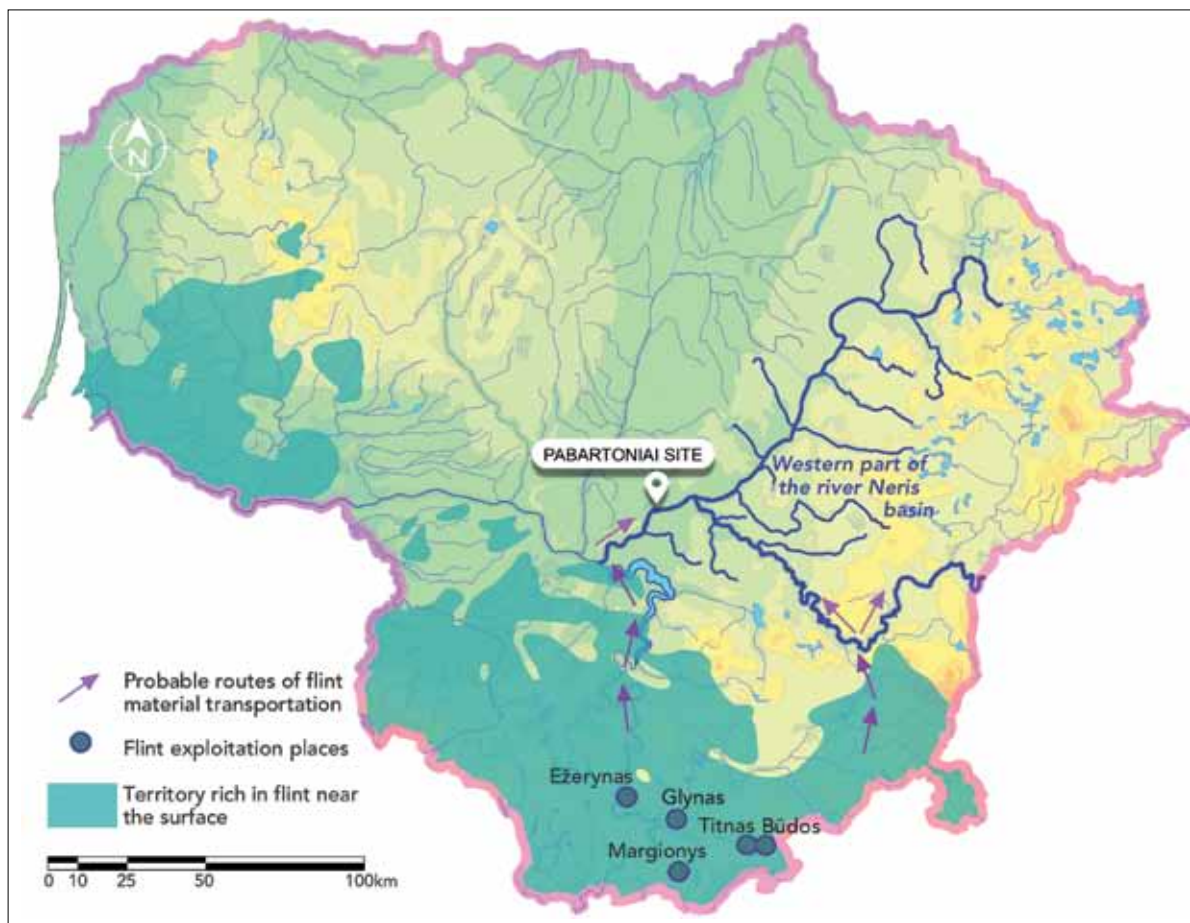


Fig. 11. An area rich in natural flint resources in the southern part of Lithuania with flint mining places identified, and the location of the Pabartoniai 1 site in the western part of the River Neris basin (drawing by G. Gudaitienė, based on Gailius et al. 1994, and Šatavičius 2016).

ping technique could have been applied, because regular blade knapping technology and the use of unipolar cores were regarded as possibly common in the Early Mesolithic (Zalizniak 1989; Šatavičius 2016). However, this presumption can only be proven after the flint debitage refit is done.

There were only a few flint implements produced on decortication flakes. Presumably, the first visitors to the site might have had access to some sources of good-quality flint material, and may have brought some partly prepared cores. The site was located on the northern border of the flinty zone of southern Lithuania, a few dozen kilometres away from the identified mining sites (Fig. 11). However, the site itself was situated in a non-flinty area, and all flint nodules found in the surrounding area (in the gravel mining places as well as on the surface) were small, and had a lot of chalky inclusions. Only one case of working a local flint pebble was recorded at the site; however, after several trial strikes, it was thrown away. The very good quality of the blanks used for Swiderian point production imply that some tools might have been prepared beforehand and brought to the site.

The flint knapping debitage left after using the unipolar flint knapping technique and the production of very regular blades was recorded around Middle Mesolithic features Nos 8 and 9. This material was ascribed to a site settlement stage later than Swiderian. Between the second and the third site settlement stages, there was not a big gap recorded; it was probably a few hundred years. Some archaeological features, as well as a large number of artefacts, were of considerable dating, and could equally have been ascribed to both stages.

The most recent site occupation stage in the Stone Age was dated to Neolithic. Some pottery and stone artefacts, as well as several features of a much darker colour unearthed in a relatively high layer, were dated to 5321 ± 45 BP FTMC-9-4 (4264-4041 cal BC [91.5%]) and 5246 ± 45 BP FTMC-9-3 (4175-3969 cal BC).

The spatial distribution of the flint artefacts and burnt bone fragments was done by filtering the archaeological data according to many different criteria. After sorting the finds by their absolute level into several layers, basic concentrations around Mesolithic features were distinguished. It was evident that features Nos 8, 9, 25 and 30 were the most important, and implied activity

zones. Feature No 9 was related to the concentration of burnt hazelnut shells, dated by AMS 14C to 8540 ± 71 BP FTMC-1-2 (7728-7481 BC [95.4%]). The sparse distribution of burnt lithics in the excavated area at all levels implied that many of them could have been affected by fire, due to post-depositional processes, e.g. a natural burning of the plant cover after the site was abandoned. However, if only the lowest level was analysed, burnt flint concentrations were visible around Middle Mesolithic features, but no burnt artefacts were exceptionally related to features Nos 10d and 25 that were hypothetically ascribed to the earliest phase of site occupation.

Some flint knapping zones were distinguished on the basis of flint debitage accumulations and the distribution of cores and core correction flakes. Three of them were related to the Middle Mesolithic features Nos 8, 9 and 30. All five zones yielded many fragmented blades, mostly regular. The remains of supposedly the earliest stage of site settling, completely used double-platform cores and blades produced by two-directional knapping, were found all over the area, especially in the flint knapping zones Nos 2, 3 and 4. These finds were probably moved from their original places by bioturbations. Apparently, three Mesolithic campsites overlapped at almost exactly the same place. Further excavation might provide an opportunity to determine where the preliminary limits of each of the site occupation areas were. But the western part of the trench yielded most of the tools typical of Late Swiderian: scrapers combined with burins, tools made out of blanks produced from double-platform cores, and scrapers with the working edge formed on the proximal end of the blank. Thus, it might have shown the approximate place of the earliest settlement's central activity zone, which was invisible when investigating the archaeological data from other perspectives.

As it might be concluded from the data given above, the Pabartoniai 1 site was chosen by Late Swiderian people as a short-term campsite. It might have been a strategic decision to settle very close to the tributary, on its terrace four metres above the small river, near a slope where water could be conveniently accessed. Most likely, the first inhabitants did not stay at the site for long, and worked on some hunted prey. As can be seen from the excavated archaeological data (approximately 40% to 50% of the site area), features ascribed to the first stage of site settling are very few. They were greyish stains with ash, tiny pieces of charcoal, a few flint tools, and debitage of knapped sandstones. Bearing in mind the good quality of the flint material used, the choice to work sandstone should be regarded as interesting: this material must have been taken for some reason other than the lack of flint. The further

investigation of this archaeological site might lead to an interpretation of the primary horizon of the site occupation, and uncover some archaeological material that could support or disprove the presumptions made above; whereas the relation between typologically/stratigraphically the earliest archaeological material and the earliest AMS 14C dates should be interpreted with extreme caution.

Discussion and results

There are still several opinions as to how the end of the Swiderian era should be regarded, and who were the people who could be called the very last Swiderians on Lithuanian territory. One option would be to extend the meaning of Late (last?) Swiderian culture when talking about the transitional unit from Swiderian to Pulli (or Kunda). It might cover all groups of people who were the last to use tanged points with a flat retouch applied to form the tangs, notwithstanding the conservative way of retaining old traditions, or a shift to the unipolar flintknapping technique and the adoption of other practices that basically show some outside influences. While Pulli should be understood as a separate unit with a northern or eastern origin, it influenced the way some of the last Swiderians formed their inventory. In addition, the elaborate and flint-saving manner of making tools should not be seen as completely changing all the groups of Swiderian culture, especially in the areas where flint material was easily available. Some people might still have traditionally used bipolar cores, while others might have shifted to 'copying' the Pulli manner of tool production (and the aesthetic aspect could also have played a role in making that decision). On the basis of the archaeological data from Lithuania and neighbouring areas, three cultural units coexisting in a shared social and physical environment might be regarded as the upmost version of the concept of the ending of the Last Swiderians' era. They may all be seen as the last tanged point users: a) Late Swiderians making tools in the old-fashioned way using cores with two platforms; b) Late Swiderians who were influenced by Pulli culture, changing their flintknapping technology to unipolar; and c) Pulli culture which might be seen as a group of newcomers and bringers of their extremely elaborate technique of tool production. Until the concept of the last Swiderians is fully clarified, the chronology of this process will also remain disputed. Thus, dating its latest limits to the end of the Preboreal or Boreal period also depends on which notion is chosen. The latest data from the Pabartoniai 1 site gives a very slight opportunity to discuss the elongated existence of Swiderian culture, or, in general, the period when tanged points were still in use in Lithuania.

However, the hypothesis for dating the end of the Late Swiderian era in Lithuania to the beginning of the Boreal period still needs to be argued. It can be proven or refuted only after more AMS 14C dates from Late Swiderian sites in Lithuania are taken into consideration; yet nearly the same ending of the post-Swiderian epoch was presumed in former archaeological studies (Kozłowski 1989; Kozłowski and Kozłowski 1996; Stefański 2017). On this point, it is highly recommended to discuss rather than avoid all Boreal dates obtained from sites that yield Swiderian artefacts. The reasoning for the disappearance of the last Swiderians is a topic that needs a separate study. The answer to why it happened might be searched for in long-term processes, like assimilation or migration, or else, yet some sudden event should be taken into consideration as well.

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Santrauka

Straipsnyje aptariama Rytų Baltijos regione aktuali akmens amžiaus archeologijos problema – Svidrų kultūros, egzistavusios finaliniame paleolite ir ankstyvajame mezolite, pabaigos datavimas. Keliamas klausimas, koks kultūrinis vienetas (ar keli) turėtų būti vadinami paskutiniais Svidrų kultūros atstovais Lietuvos teritorijoje ir kokios kultūros žmonės galėjo būti paskutiniai, naudoję įklotinius strėlių antgalius – įrankio formą, paveldėtą iš paleolito laikų. Hipotetiškai svarstomas bene pats plačiausias galimas pirmosios mezolito pusės vaizdas kultūrų įvardijimo prasme: siūloma diskutuoti apie galimai vienu metu egzistavusias dvi Svidrų kultūrą tęsusias kryptis – vėlyvuosius svidrus ir svidrus, perėmusius kai kuriuos įrankių gamybos ypatumus iš toje pačioje socialinėje bei geografinėje erdvėje kurį laiką koegzistavusios Pulli kultūros atstovų (1–4 pav.). Pastarosios šaknų galimai reikėtų ieškoti į rytus ar šiaurę, ko gero, nesiejant jos kilmės su Svidrų kultūra.

Į diskusiją įtraukiami ir pastaraisiais metais gauti naujai duomenys iš Pabartonių akmens amžiaus gyvenvietės Neries dešiniajame krante, Vidurio Lietuvoje (5 pav.). Atlikus anglies mėginių iš įvairių skirtingų objektų AMS 14C datavimą, radinių pasiskirstymo, stratigrafijos analizę bei suskirsčius titnaginę medžiagą pagal tipologinius ir technologinius kriterijus, buvo išskirti keli šios vietos apgyvendinimo etapai: bent du mezolite ir vienas etapas neolite (6–8 pav.). Diferencijavus šių etapų medžiagą ir datavimo duomenis paaiškėjo, kad radiniai, būdingi ir galimai priskirti ni vėlyvajai Svidrų kultūrai, yra išblaškyti, ir atskiro būtent šiam apgyvendinimo etapui priskirto radinių horizonto nustatyti beveik neįmanoma. Tarp gautų gyvenvietėje atidengtų objektų datavimo rezultatų išsiskyrė kelios borealio pradžios datos, kurios skyrėsi nuo Pabartonyse rasto vidurinio mezolito radinių horizonto ir datų. Atlikus išsamesnę analizę paaiškėjo, kad šioje gyvenvietėje yra vėlyvųjų svidrų įrankių kompleksas, dvi galimai su vėlyvojo mezolito kontekstu nesusietinos dėmės su skaldytais smiltainio luitais ir kelios santykinai ankstyvos datos – elementai, kurie galimai galėtų būti interpretuojami susieti tarpusavyje kaip paties ankstyviausio Pabartonių gyvenvietės apgyvendinimo etapo archeologinė medžiaga (9–11 pav.). Straipsnyje

iškeliamas kol kas labai mažai pagrįsta hipotezė, kad galbūt vėlyvieji svidrai, nepatyrę Pulli kultūros technologinės įtakos, galėjo egzistuoti ilgiau, nei manyta iki šiol – iki borealio pradžios.

Straipsnyje taip pat bandoma analizuoti vadinamosios Kundos kultūros egzistavimo klausimą ir iki šiol „tarpiniu“ inventoriumi tarp Svidrų ir Kundos (ar Pulli) kultūrų vadintus dirbinių kompleksus, kai gyvenvietėje randami tik karklo lapo formos strėlių antgaliai, gaminti iš taisyklingų skelčių, atskeltų nuo vienagalių skaldytinių, su plokščiai retušuota įkotine dalimi bei viršūne reverso pusėje, bet neaptinkama tipišku Pulli vienašonių ar su ryškiai įsmaugta įkote antgalių. Siūloma plėsti vėlyvosios Svidrų kultūros sąvoką, į ją įtraukiant ir dirbinius, kurie buvo panašūs į gamintuosius Pulli technologija, tačiau skyrėsi nuo klasikinių Pulli dirbinių. Tuo tarpu laipsnišką visų ankstyvojo mezolito kultūrų perėjimą prie vienagalių skaldytinių siūloma suvokti nebūtinai kaip tai, kad viena kultūra perėmė kitos kultūros technologiją vienu ypu, o veikiau kaip į ilgai trukusį netolygaus tam tikros skaldymo technikos įsisavinimo procesą.

Straipsnyje pasiūlyta Svidrų kultūros egzistavimo pabaigos vėlinimo hipoteze norėta išprovokuoti diskusiją, ką šiuo metu galima pasakyti apie šios kultūros datavimą, beveik neturint tikslų datų. Taip pat skatinama neignoruoti iš vadinamųjų svidrų paminklų gautų mezolito datų kaip visuomet neįtikinamų ar klaidingų. Siūloma ateityje atlikti kuo daugiau datavimo tyrimų gyvenvietėse, siejamose su vėlyvųjų Svidrų ir Pulli inventoriumi Lietuvos teritorijoje ir taip tikslinti svidrų epochos chronologines ribas.